Study Gist (Tellus)

Study Title. Rapid Generation of Terrain Database (Tellus)

Purpose. Tellus is man-in-the-loop terrain database creation software that integrates standard data sources with image sources to produce medium-to-high resolution terrain databases suitable for combat maneuver simulation. The Tellus system is composed of portable, interoperable, and reusable components to convert world wide terrain elevation and imaging data into elevation and feature data for terrain databases. A key aspect of the system is the common user interface.

Main Assumptions.

- Terrain database creation remains a significant challenge in modeling and simulation.
- Man-in-the-loop database creation software must be improved.
- Correlation of terrain databases in virtual and constructive simulations is increasingly important.
- Techniques from artificial intelligence can simplify and improve terrain database creation.

Scope of Study and Limitations. The study was limited to producing a prototype to create terrain databases for two simulations: Janus (a multi-sided interactive wargame used for training and analysis) and Pegasus (a video-realistic, three-dimensional virtual simulator used to fly through terrain). The data sources were limited to DTED (elevation), CIB (raster photo images), ADRG (raster map images), and S1000 (integrated elevation and features).

Principle Findings.

Platform Independence. To produce a prototype that can be used on several Unix platforms, the Terrain Tool Kit (TTK) and Terrain Feature Builder (TFB) were built using Motif 1.2.4 (Motif standard widgets), X11R5 (X-Windows standard), and GNU C 2.6.0 (an ANSI C compiler). Versions of the prototype have been compiled and executed on Sun, SGI and HP workstations.

Terrain Tool Kit. The tool kit was created to import various data sources for creating a data set with the current Pegasus standard element definition (STD) or the old FHL (Fort Hunter Ligget PVDB) definition. Currently four data sources are used to generate a data set. They are DTED, CIB (both of which are provided by NIMA), FHL, and four meter photo reduction grids (contractor supplied data). Only the elevation and grayshade fields are being filled within the STD/FHL data sets.

Terrain Features Builder. TFB is used to create Janus terrain databases that include features such as roads, rivers, fences, buildings, vegetation, and urban areas. TFB provides a feature drawing tool that is used in conjunction with ADRG images. TFB can be used to create new terrain databases where the elevation is processed using the TTK or to add new features to existing Janus terrain databases.

S1000-to-Janus. STJ is used to create Janus terrain databases with feature and elevation data correlated to S1000 source data. S1000 source data is used to generate databases for several virtual simulators and for the ModSAF constructive simulation. STJ uses the S1000 API (and thus only works on the SGI platform).

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Tellus Planning Assistant. TellusPlan is an intelligent assistant that bargains between user goals and system resources in the integration of terrain databases from separate source databases. It uses nondeterministic methods from artificial intelligence and a detailed cost model to infer the most reasonable compromise. It produces scripts for the TTK that can be used to produce a terrain database.

Impact of this Effort. The Tellus software has been used to create terrain databases that support several TRAC projects for J-Link (Janus Linked to DIS) and Soldier Station. The TFB prototype has been distributed to TRAC-WSMR for review. Researchers in the Computer Science department of the Naval Postgraduate School are using the TTK prototype and have proposed research to expand the capabilities of TellusPlan.

Quality of Contractor Performance. Dr. Wolfgang Baer (Pegasus), Mr. Chris Reed (TTK, TFB and STJ), Ms. Shirley Pratt (STJ), and Dr. Neal Rowe (TellusPlan) contributed to the Tellus software prototypes. The quality of their work was well above average.

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DTIC. Not Assigned.

Personnel Briefed. Mr. Bauman (early FY97)

Conference Presentations.

- Real Time Scientific Rendering for General Sensors, 1997 Spring SIW
- Global Terrain Design for Realistic Imaging Sensor Simulation Database, 13th DIS Workshop.
- High Resolution Terrain Representations for Live-Virtual Test Applications, 64th MORS Symposium

Conference Proceedings.

- Global Terrain Design for Realistic Imaging Sensor Simulation Database, 13th Workshop on Standards for the Interoperability of Distributed Simulations, Volume I, p. 19, 18-22 Sep 95 Orlando, Florida.
- Real Time Scientific Rendering for General Sensors, 1997 Spring Simulation Interoperability Workshop, Workshop Papers Volume I, p. 535, IST-CF-97-01.2, 3 March 1997, Orlando, Florida

Journal Publications. None.